REMARKS

The Final Office Action mailed July 7, 2009 and the references cited therein have been carefully considered. Claims 1, 2, 4-26 are now pending in the application, of which Claims 22 and 24-26 have been withdrawn from consideration.

By this Response, Applicants amend Claim 1, 4-6, 8, 9, 12-14 and 16. Claim 1 has been amended to clarify aspects of the disclosed technologies. In particular, Claim 1 has been amended to clarify that it is a "profile" of each diffraction grating that is being defined by the relief parameters, at least one of which is varied periodically, as further defined by the claim. Support for this terminology can be found specifically at page 17, lines 7-9, as well as more generally throughout the specification and drawings. The further amendments to Claim 1 merely re-organized the previously presented claim language. Additionally, the amendments to Claims 6, 8, 9 and 14 are introduced to conform the claims to the amendments to Claim 1, with reference to the axis extending across the surface region. The amendments to Claims 4, 5, 12, 13, 16 and 17 are intended to ensure proper antecedent basis for claim terms in view of the amendments to Claim 1. Thus, no new matter or new issues are presented by the amendments herein. Accordingly, entry of these amendments and further consideration are respectfully requested.

Applicants respond to the issue raised in the subject Office Action more specifically below and respectfully requests reconsideration of the pending rejections.

Applicants' Interview Summary

Applicants appreciate and acknowledge the telephone interview conducted on October 27, 2009 between Examiner Joshua L. Pritchett and the undersigned discussing the outstanding prior art rejections in view of proposed amendments to Claim 1. The amendments proposed at that time were identical to the amendments to Claim 1 presented herein. Accordingly, Applicants hereby introduce the proposed amendment to Claim 1, along with conforming amendments to the remaining dependent claims. Also, along with the proposed amendments, the below remarks regarding the pending prior art rejections were also presented.

Additionally, during the interview the Examiner requested clarification with regard to the term "phase-displaced." In that regard, the undersigned explained that as shown in the drawings, more generally described throughout the specification and commonly used in mathematics, the "phase" of the Parameter Variation Function (PVF) refers to the position of a period of the function relative to a reference point or origin. Thus, a displacement of that phase (i.e., "phase-displaced") refers to a change or shift in that periodic position relative to a common origin. Additionally, Applicants advise that in the original German priority document, from which the instant application claims priority, the term can alternatively be translated as "phase-shifted" (which is the more common mathematical expression for this characteristic and intended by Applicants to be the equivalent herein). This aspect of the invention is particularly illustrated in the annotated Fig. 2b included below. However, Applicant would further like to add here that it should be understood that while Fig. 2b shows both separate pattern regions to be identically

phase-shifted, the phase-shift for those regions need not be the same. Thus, in accordance with the currently amended version of Claim 1, although "the PVF defining the profile in the one or more pattern regions is phase-displaced with respect to the PVF defining the profile of the background region," the phase-displacement of the one or more pattern regions need not be the same.

In view of discussions had during the interview, in line with the below remarks, it was agreed that the proposed amendments overcome the cited prior art of record. Accordingly, favorable reconsideration of the application as now presented is hereby requested.

Claim Rejections under 35 USC § 102 and 35 USC § 103

Claims 1-10, 12, 13, 15-19, 21 and 23 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Published Patent Application No. 2001/0043396 to **Lee**. Also, Claims 11, 14 and 20 are rejected under 35 U.S.C. §103(a) as being unpatentable over **Lee** in view of U.S. Patent No. 6,157,487 to **Staub**. Applicants respectfully traverse these rejections as set forth more fully below.

- **A Profile:**

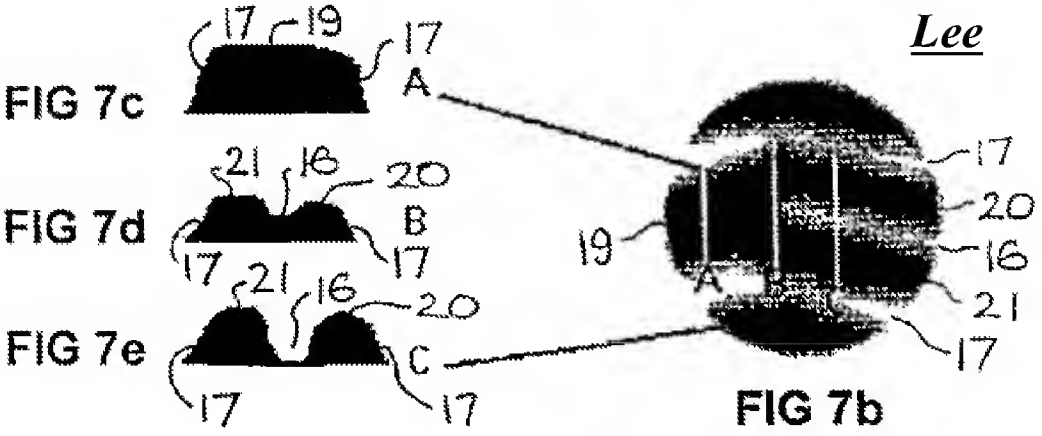
One aspect of the claim amendments now recites "**a profile** of each diffraction grating being defined by relief parameters." Support for this terminology can be found in the specification at page 17, second full paragraph; page 18, third full paragraph; as well as more generally throughout the specification, including the drawings. This recitation is intended to refer to the vertical section view commonly used to define and illustrate a diffraction grating. In

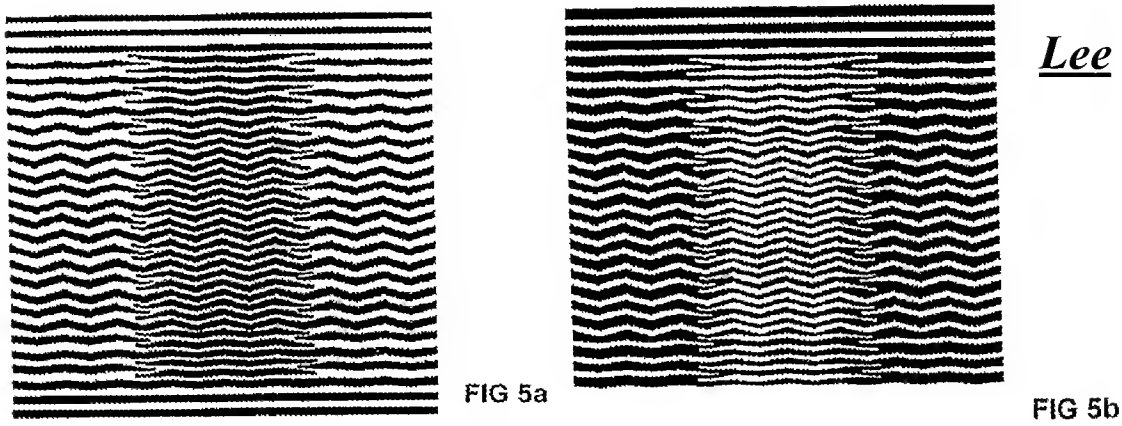
this way, a profile of a diffraction grating necessarily extends along a Z-axis of the substrate layer (the axis that defines its thickness). Also, Claim 1 further recites that the "profile" of the diffraction grating is defined by relief parameters at least one of which is varied periodically in accordance with a function (the parameter variation function – PVF). The inclusion of "periodic" in the original claims was understood to mean that the claimed variation of the relief parameters is characterized by recurrence or reappears at regular intervals. While Claim 1 further recites that both the pattern region and the background region of the substrate layer are defined by **a** PVF (thus they share a common defining function), those regions are differentiated in that the common function (the PVF) is phase-displaced. In this way, the diffraction grating profile should vary periodically, with the function defining that periodic variation also appearing in both regions, but being phase-displaced. Below we consider each of the recited relief parameters as they relate to U.S. Published Patent Application 2001/0043396 to **Lee** (which is the primary reference in all the prior art rejections of the pending Final Office Action) in contrast to the instant application.

- **Relief Shape**:

In Lee, the relief shape, as it relates to the diffraction grating **profile**, is formed by a series of peaks and valleys. For example, a small portion of three different diffraction grating profiles are illustrated in Lee Figs. 7c, 7d, 7e (taken from Fig. 7b) shown below. However, if each of those cross-sections were expanded across a greater extent of Fig. 7a, they would reveal that the relief shape for each of the profiles of those diffraction gratings (7c, 7d, 7e) do not vary (they maintain the same constant sinusoidal pattern). Thus, it can not be said that the relief shape in Lee varies periodically in either the pattern region or the background region. What is more, although the profile of the diffraction grating changes from the pattern region to the background region, the profiles from those regions are not defined by a common periodic function that is phase displaced. For example, consider Lee Figs 5a and 5b (also shown below) and a profile that extends across both the outer region and the central region (from the bottom of the page toward the top). While the profiles for the top and bottom regions differ from that of the middle region,

those profiles are not phase displaced. The central region in Lee merely has a higher frequency, but it is a constant frequency across that region.





In contrast to Lee, consider Figs. 8a-8e of the instant application, shown below. In Fig. 8a, the Region 8 represents a single period of the PVF. The relief shape of the profile of the diffraction grating defining that period is varied by changing the width of the rectangular shapes as a function of the x-axis. In this exemplary embodiment the width of the relief shape is changed three times during the period. Figs. 8c-8e show each of the three different relief shapes corresponding to portions a, b, c. Other embodiments of the present application, such as that shown in Figs. 2b, 5d or 6b demonstrate the phase-displacement aspect.

This Application

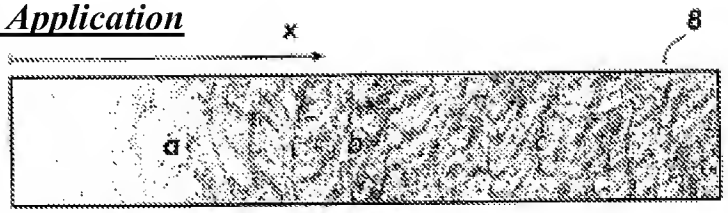


FIG. 8a

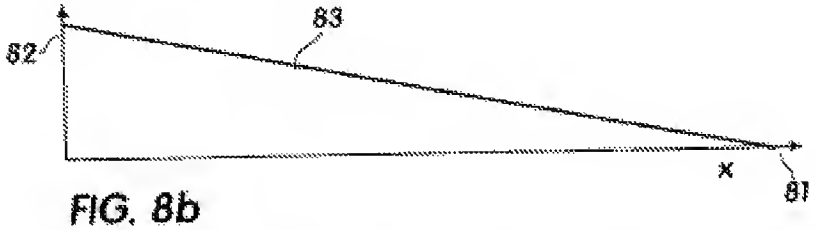


FIG. 8b

FIG. 8c

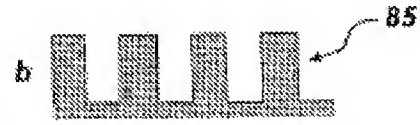


FIG. 8d

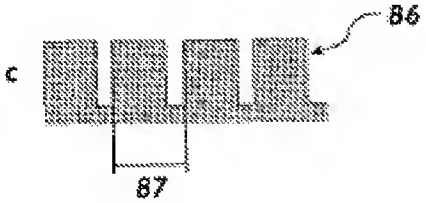


FIG. 8e

- **Relief Depth:**

The same illustrative examples from Lee shown above can be used to differentiate this aspect of the present invention. As with the relief shape mentioned above, the relief depth is constant across each diffraction grating profile. For example, the depth of the profile shown in

Fig 7c is the difference between the top of ridge 19 and the bottom of groove 17. While the groove depth could be considered to vary periodically in the diffraction grating profile shown in Fig. 7d, there is no phase-displacement between a pattern region and background region, as recited in the Claims of the instant case.

In contrast to Lee, consider Figs 6a and 6b of the instant application, shown below. In Fig. 6a, across a single period 63 of the PVF the relief depth is varied. Thus, the diffraction grating profile is periodically varied by changing the depth of the sinusoidal function across the y-axis. Further, Fig. 6b illustrates how that same function is included in both the pattern and background regions, yet one is phase-displaced relative to the other.

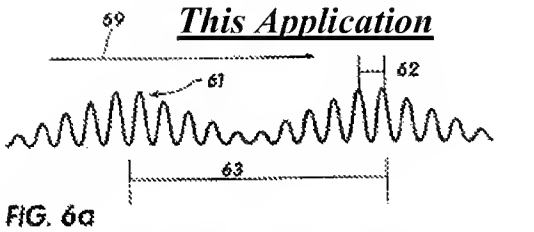


FIG. 6a

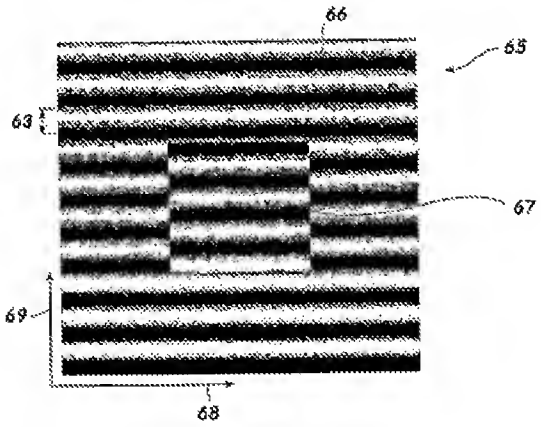


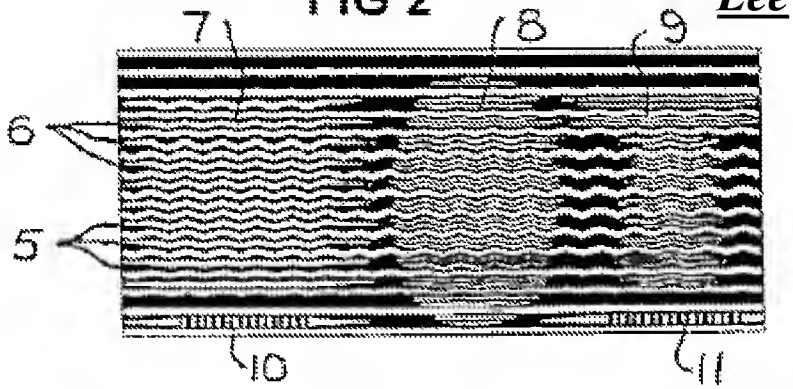
FIG. 6b

- **Spatial Frequency:**

In Lee, it is Applicants' understanding that the spatial frequency is similarly constant across all regions. Even assuming, for argument's sake, that at least one of the embodiments of

Lee includes a periodically varied spatial frequency, there is no phase-displacement of that special frequency variation from a pattern region to a background region. For example, as shown below with regard to Lee Fig. 2, the pattern regions 8, 9 that appear as an oval and the letter "T", respectively, include a series of three thin wavy lines separated by a fatter wavy line. Even assuming that pattern change represents a periodic variation, that same pattern of variation does not continue in any form into the background region and is not phase-displaced in any other region of the surface.

FIG 2 ***Lee***



In contrast, note Figs. 5a, 5b, 5c of the instant application, shown below, which illustrate a periodically varied spatial frequency. The vertical axis 52 represents the frequency and the horizontal axis 51 represents the x-axis of the surface. Thus, the period of the profile of the diffraction grating has a special frequency that is varied in accordance with different PVF's for each of those three embodiments. Also, Fig. 5d shows how the PVF of Fig. 5b (a triangular function) can be common to a pattern region and a background region, yet distinguished by a phase-displacement of that function.

This Application

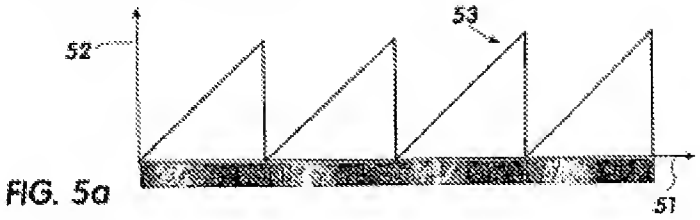


FIG. 5a

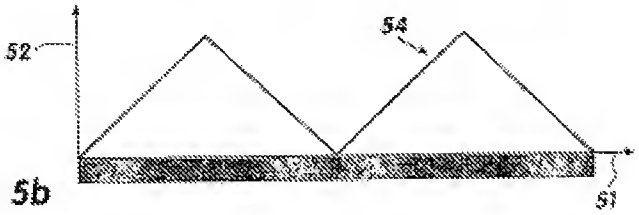


FIG. 5b

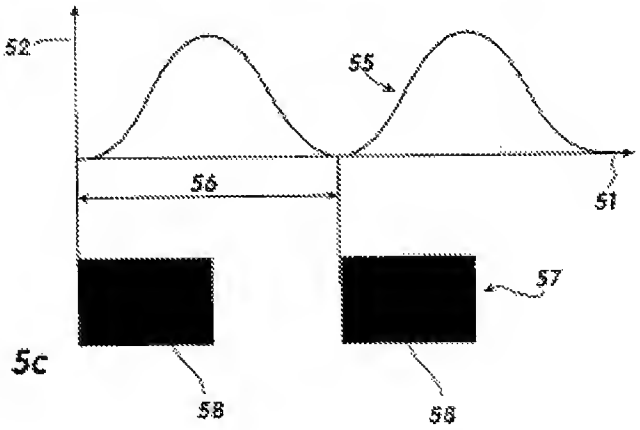
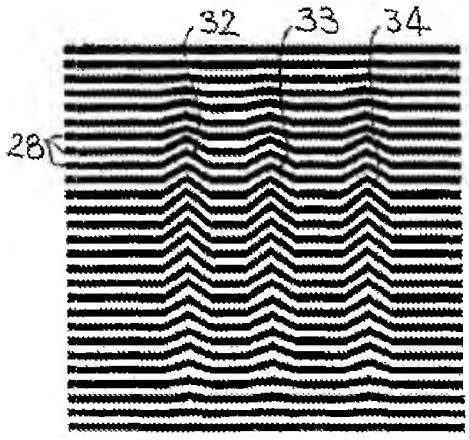


FIG. 5c

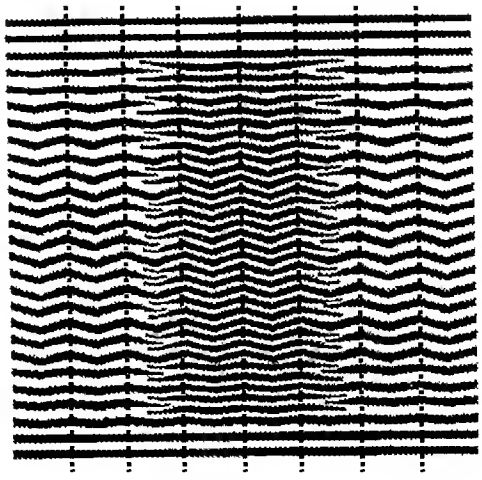
- **Azimuth Angle:**

In Lee, either the azimuth angle of the profile of the diffraction grating is not varied periodically or there is no phase-displacement between the pattern region and the background region. Consider Lee Fig. 11c shown below. Inside the pattern region (across regions 32, 33, 34) the azimuth angle appears to vary across the surface in a shallow triangular function spaced between portions with no azimuth angle change, but no azimuth angle variations are included in the surrounding background region. Now consider the embodiment illustrated in Lee Fig. 5a shown below (with annotations). While the azimuth angle can arguably be said to vary

periodically in accordance once again with a shallow triangular function, there is no phase displacement between the pattern region and the background region. The annotations, shown as dotted vertical lines mark the peaks of each triangle function. Those annotation lines illustrate how the background region is in-phase with the central pattern region. Accordingly, once again lee fails to disclose all the elements of the claimed invention.



Lee **FIG 11c**



Lee FIG 5a

In contrast, Fig. 2b shown below (also annotated) illustrates the azimuth angle of the diffraction grating varied periodically in accordance with a sine function in both the pattern region and the background region. The annotations to Applicants' drawings emphasize the phase-displacement between the background region 28 as compared to the pattern regions 29, 30. The period of variation in the background region is denoted by the long vertical dotted lines and the period of variation in the pattern regions is denoted by shorter dashed lines.

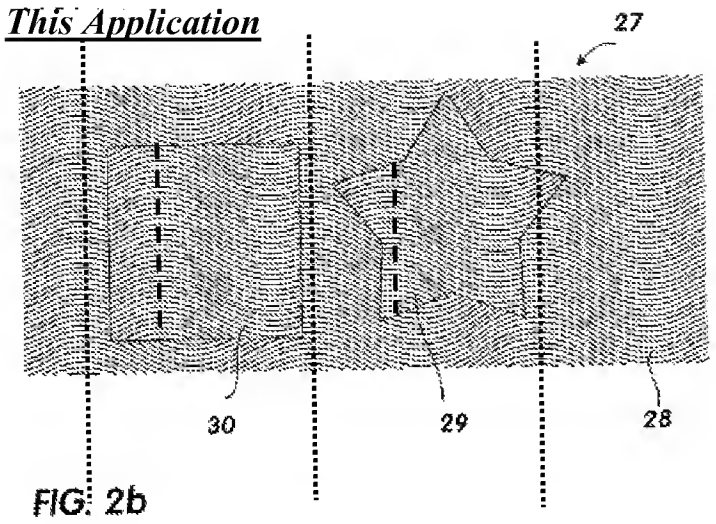


FIG. 2b

Accordingly, Lee fails to teach or reasonably disclose all the elements of the claimed invention. Also, U.S. Patent No. 6,157,487 to **Staub**, also cited in the subject Office Action, fails to teach or reasonably disclose the above noted aspects of the claims. Thus, Applicants respectfully request reconsideration and withdrawal of the rejection of Claims as suggested in the proposed amendments herein. Thus, Lee fails to teach or reasonably disclose all the elements of the claimed invention. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections of Claims 1-10, 12, 13, 15-19, 21 and 23 under 35 U.S.C. §102(b) based on Lee, as well as Claims 11, 14 and 20 under 35 U.S.C. §103(a) based on Lee in view of Staub.

Conclusion

Applicants submit that the claims, particularly independent claim 1, are clearly distinguishable from the cited prior art references. Also, claims 2, 4-21 and 23, which ultimately depend from Claim 1, are similarly patentable over the art of record by virtue of their dependence. Also, Applicants submit that Claims 2, 4-21 and 23 define patentable subject matter in their own right. In view of the foregoing remarks, Applicants respectfully request reconsideration and allowance of the claims presented.

If the Examiner has any questions or suggestions to expedite allowance of this application, she is cordially invited to contact Applicants' attorney at the telephone number provided.

Respectfully submitted,

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